apertures, has been several times seen by Franks with a 5-inch object-glass; my less acute vision with 9⅓ inches of a silvered mirror distinguished it in 1878, not readily, indeed, but quite certainly, in the absence of the primary from the field.

The variable light of the outermost, Japetus, in different parts of his orbit, has long been known, and might have been readily explained by a synchronism of rotation and revolution, but for superinduced irregularities similar to those of the satellites of Jupiter, and probably depending upon a similar cause. Schröter detected differences of brightness in some of the others, on opposite sides of the planet; but the subject deserves a fuller investigation.

T. W. WEBB

NOTES

WE record with deep regret the death of John Allan Broun, F.R.S., on Saturday last, at the age of sixty-two years. Mr. Broun was many years in India, as Director of the Observatory of the Maharajah of Travancore, and has been resident in London for the last six years. We hope next week to give details of Mr. Broun's life and the valuable services he has rendered to meteorology.

WE regret to learn that Prof. A. H. Sayce is compelled to spend the winter in Egypt on account of his health. We trust his sojourn on so congenial a soil will quite re-establish him.

A MARBLE medallion of Father Secchi has been placed in front of the Stilvio Observatory, 2,543 metres above the level of the sea. The observatory owes its establishment to him.

THE Swedish Academy of Sciences has appointed Dr. B. V. Wittrock, the celebrated algologist, to be keeper of the botanical department of the Swedish State Museum, in succession to Prof. N. J. Andersson, who has retired in consequence of the bad state of his health.

THE works for creating an astronomical observatory on the top of Etna were progressing favourably, but have been arrested for some months owing to the state of the weather. The central iron cupola and the telescope would have been placed this year if the operation had not been prevented by the large quantity of snow which fell prematurely on the mountain. This establishment is unrivalled for its position under an admirable sky, and will be placed on an immense natural platform situated at an altitude of 3,000 metres above the sea. The central crater has an elevation of 350 metres, and the observatory has been built at its very foot. An hotel is also being built, where twenty persons can find board during fine weather.

THE Municipal Council of Lyons, after a protracted discussion, has voted a credit for raising a statue to Ampère, who was, with Arago, the inventor of the electro-magnet. Ampère was a Catholic, and the son of a magistrate who had been beheaded at Lyons after the great revolution of 1793. The elder Ampère had written the charge against Challier the *Montagnard*, whose death caused the breaking out of civil war and the shedding of the blood which deluged Lyons during so many months.

THE death is announced of the eminent physicist, Friedrich von Ewald. He died at St. Petersburg on October 16 last, at the age of sixty-six years. He was for many years instructor to the Czarewitch.

FRIENDS and admirers of the late Herr Theodor Heuglin, the well-known African traveller, have erected a monument to his memory in the Prager Cemetery, at Stuttgart; it consists of a large erratic block from Upper Suabia, adorned with the medallion portrait of the deceased. Prof. Kopff, of Baden Baden, was the sculptor of the medallion. The monument was unveiled a few days ago. Thee

THE death is announced of Mr. Serjeant Cox, on Monday, in his seventieth year. Mr. Cox was known as the author of several works in physiological psychology, written mainly from a spiritualistic point of view.

AT Hamburg, the resolution has been passed to erect a new Natural History Museum, for which the sum of 1,000,000 marks (50,000*l.*) will be expended. It appears that through the great marine trade of the city, its rich natural history collections are rapidly increasing year by year. Up to the present not one half of these collections could be properly exhibited to the public for want of space. All this will be changed when the new building is completed.

A CATALOGUE of scientific serials, from 1633 to 1876, has been recently prepared by Mr. Samuel H. Scudder, assistant-librarian at Harvard College Library, and under the auspices of that library, which has met the expense of publication, with the expectation that the demand for the volume will refund the outlay, and with the promise that, if so far remunerated, this shall be the beginning of a series of "works such as may be properly undertaken by a public library, and do not offer inducement for commercial speculation." The catalogue embraces the transactions and bulletins or proceedings of learned societies in the natural, physical, and mathematical sciences of all countries, as well as independent journals. It is the result of a large amount of painstaking labour and should prove an invaluable companion to those engaged in research, or otherwise interested in the progress of science.

FEW local natural history societies can show a better record of work done than the Torrey Botanical Club, the *Bulletin* of which is published monthly or bi-monthly. In addition to records of localities and descriptive articles of local and geographical interest, the pages of this publication not unfrequently contain contributions of sterling value on important points of morphology and physiology. Articles of this character in the numbers which have recently reached us are "Notes on the Relative Age and Dimensions of a Number of Different Trees," by N. L. Britton, and "A Few Notes on the Abnormal Absence of Colour in Plants," by A. Hollick.

IT is intended to erect a statue at Hanover in memory of the late eminent technologist, Karmarsch.

THE recent Hungarian earthquakes were coupled with phenomena of a most remarkable nature. The large island in the Danube near Old Moldowa was completely cleft in two by one of the shocks. From the chasm thus formed a gigantic column of water shot forth partly flooding the island. On October 18 the giant fountain suddenly ceased to flow, but numerous funnel-shaped craters had formed from which black sand and clay were ejected. Near Weisskirchen the old ruins of the Castle of Golubacz have fallen in completely, and in the vicinity several caves were rendered inaccessible. These caves were the breeding places of the dreaded Kolumbacs mosquitos, and if this insect is thus exterminated the earthquake may, with all the damage it did, have yet been of some use. Another smart shock was felt at Temesvar on Friday morning last. A violent earthquake is reported from Iceland. It occurred on September 24 last and is ascribed to volcanic eruptions in the Krisuvik mountains, a locality where eruptions have not been known within the memory of the present generation.

RUDOLF FALB has written from San Francisco to German friends to inform them that a monument in Bolivia much more ancient than the times of the Incas has given him a clue to the origin and development of speech and writing. He is apparently inclined to recur to the Semitic hypothesis.

AT the opening meeting, last week, of the Society of Arts the following prizes were awarded:—The Gold Medal, offered for the best means of saving life at sea, to Messrs. J. and A. W.

Birt, "for the collection of buoyant articles sent in by them;" the Society's Silver Medal, to Mr. Herbert Singer, for his "Essay on the Art of the Silversmith;" to Mr. F. Toplis and to Mr. Joseph Lucas, for their papers containing "Suggestions as to the best Means of dividing England and Wales into Districts for the Supply of Pure Water;" to Mr. Alfred Haviland, M.R.C.S., for his paper on "The Distribution of Disease popularly considered;" to Mr. John Hollway, for his paper on "A New Application of a Process of Rapid Oxidation, by which Sulphides are utilised as Fuel;" to Mr. Conrad W. Cooke, for his paper on "Edison's Loud-Speaking Telephone;" to Mr. Thomas Wardle, for his paper on "The Wild Silks of India, principally Tusser;" to Dr. William Wallace, F.R.S.E., for his paper on "Gas Illumination."

THE second part of vol. xxiv. of the "Mémoires de la Soc. de Physique et l'Histoire Naturelle de la Genève" has just appeared. It contains:—Report of the President to December 31, 1878, by Prof. E. Wartmann; Researches on the Fecundation and the Commencement of Henogeny among Various Animals, by M. Hermann Fol; On the Genus Hemimerus, Wolk., apparently furnishing a new order in the class of Hexapods, by M. H. de Saussure; Description of a New Species of Trygonid belonging to the genus Pteroplatea, by M. Godefroi Lunel; Comparative Anatomy of the Leaves in some families of Dicotyledons, by M. Casimir de Candolle.

IN reference to an article in the *Globe* on Sapphires in Siam, Mr. Bryce-Weight writes to that paper that through one of the Siamese princes in England he has learned that there are several sapphire mines in Siam, on the sea coast, with thousands of people at work, valuable gems having been found and sold at a good profit.

IN the beginning of October there was discovered, at about a kilometre from Guisseny, under a mass of rocks, a cavern fifteen metres long by four broad. This cave has two openings, one towards and about four metres above the sea, the other towards the land. The cavern was found throughout its length covered with a bed of ashes and charcoal about two centimetres thick. Underneath this was found a sort of dry stone masonry, then human bones, remains of cinerary urns, evidently of "Celtic" origin, and a considerable quantity of bones of mammals. Among the latter are some which do not appear to belong to contemporary fauna. Finally, a stone hammer and a sharp, polished axe of porphyry appear to show that this cavern is a sepulchral grotto of prehistoric times.

A SECOND enlarged edition is announced by Mayer, of Cologne and Leipzig, of Sonnenschmidt's "Kosmologie," the history and development of the universe on the basis of the most recent scientific researches.

THE *Journal of Applied Science* draws attention to the substitution of paper for wood in Germany in the manufacture of lead-pencils. It is steeped in an adhesive liquid and rolled round the core of lead to the required thickness. After drying, it is coloured to resemble an ordinary cedar pencil. The pencils sell in London to retailers at about 3*s*. a gross.

AT the first meeting of the Statistical Society, on the 18th inst., the President, Mr. Brassey, presented the Howard Medal and 20*l*. to Miss Beatrice A. Jourdan, as the writer of the best essay "On the Improvements that have taken place in the Education of Children and Young Persons during the Eighteenth and Nineteenth Centuries." The President announced as the subject of the essay of next year, "The Oriental Plague, in its Social, Economical, Political, and International Relations."

THE long pending telephone litigation in the United States has at last been settled by a compromise which leaves Prof. Bell master of the field. The National Bell Telephone Company have bought up the conflicting rights, and acquired all the telephonic inventions of Elisha Gray, of Mr. Edison, and of Mr. G. M. Phelps. The Western Union Telegraph Company, however, is to be licensed to convey telephonic messages, while the right to establish telephone exchange systems is to remain exclusively with the Bell Company. The shares of the National Bell Telephone Company are now quoted at 700 per cent.

THE distribution of the correct time by electricity, as inaugurated by Leverrier, is now organised at Paris, on an immense scale, by the Municipal Council. A length of 15,000 metres of tubes is placed alongside the Boulevards and the principal streets, where a large number of dials will mark the time during day and night. Private clocks will be kept to time on payment of a small fee.

A COMPETITIVE experiment took place on September 19 in the green-room of the Grand Opera of Paris, on the respective illuminating power of Jablochkoff candles and Werdermann lights. The Werdermann light was found most steady, and the Jablochkoff most powerful. The experiments will be continued next week before the public, and a final resolution will be taken afterwards. The President of the Republic and the Minister of Fine Arts are represented.

ON November 11 the stream of falling stars was observed, at nine o'clock, at Chatelherault, when the sky was exceptionally clear.

A COURSE of six evening lectures on Photography will be given at the Sorbonne every Thursday evening by M. Davanne, President of the Photographic Society of Paris, with experiments. These lectures are organised by the Scientific Association of France, presided over by M. Milne Edwards. The ordinary evening lectures will begin only in January.

THE second French Atlantic cable has been successfully laid down from Brest to the American shores, through the Scilly Islands and Newfoundland. Congratulatory messages have been exchanged between the Presidents of both Republics.

PHOTOGRAPHERS, professional and amateur, will, we believe, derive much assistance from the "Photographic Printer's Assistant," by Mr. W. Heighway, just published by Richardson and Best. The directions given are such as have been found successful in actual practice.

M. CHARCOT, the chief physician of Salpetrière, opened, three years ago, a course of lectures on nervous affections, annexed to his clinic. The number of persons asking for admission has been so considerable that the administration of Public Assistance has built an amphitheatre with 500 seats in the hospital. The lectures, which are delivered every Sunday, were begun on November 16, before a full house. The amphitheatre was fitted up with an Alliance Magneto-electric machine, worked by the steam-engine of the washing-house. In each lecture a number of patients are introduced on the platform illustrating the theories of the lecturer, and many photographs are projected on the screen by electricity. In the lecture of November 23 the lecturer projected two engravings reproduced from Montgeron, an author of the beginning of the eighteenth century, who advocated the genuineness of miracles executed on the grave-stone of Diacre Paris. One of these represented a young lady who had been declared by the doctors of the age to be incurable of club-foot, and the other engraving the same person after having been cured in a trance. These two figures were engraved and published by Montgeron as exhibiting a case of supernatural agency. M. Charcot proved they were analogous to several of the cases which had been presented to his audience and could be cured by the same process.

DR. RICHARDSON asks us to say that in his article on Fleuss's New System of Diving in last number, p. 63, col. 2, 25th line from bottom, "fully seven minutes" should be "forty-seven minutes."

THE additions to the Zoological Society's Gardens during the past week include a Yellow Baboon (*Cynocephalus babouin*) from West Africa, presented by Mr. Cecil B. Hankey; a Collared Peccary (*Dicotyles tajacu*) from South America, two Domestic Sheep (*Ovis aries*), presented by Mr. H. Sandbach; a Little Grebe (*Podiceps minor*), British, presented by Mr. A. F. Buxton; a South American Rat Snake (*Spilotes variabilis*) from South America, presented by Mr. Thomas Harrod; two Geoffroy's Cats (*Felis geoffroii*) from Paraguay, two Barbary Falcons (*Falco barbarus*) from North Africa, a Red-throated Diver (*Colymbus septentrionalis*), British; a Common Curlew (*Numenius arquata*), European, deposited; two Common Tiskins (*Chrysomitris spinus*), a Reed Bunting (*Emberiza schœniclus*), a Pied Wagtail (*Motacilla yarrelli*), British, purchased; a Gaimard's Rat Kangaroo (*Hypsiprymnus gaimardi*), two Smooth Snakes (*Coronella lævis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE "URANOMETRIA ARGENTINA."—The publication of this great and meritorious work is just announced, though, so far as we know, the complete volume has not yet reached Europe. The system of observations upon which it is based was designed and commenced by Dr. B. A. Gould, the distinguished director of the Argentine Observatory, immediately after his arrival at Cordoba in September, 1870, on accepting the superintendence of the new establishment, and while awaiting the completion of the observatory buildings and the arrival of telescopes which had been ordered in Europe, but delayed by the outbreak of the Franco-German war, and the work upon it has been continued with more or less attention to the present year. It was intended to represent in a series of charts and accompanying catalogue the sky from the south pole as far as 10° north of the equator, as it appears to the naked eye, showing all stars down to a round magnitude fixed at 7·0, with their characteristics of duplicity, variability, and colour, and the milky-way in all its ramifications and gradations of brightness. The actual observations were assigned to the four assistants, Messrs. Rock, Davis, Hathaway, and Thome, who had proceeded to Cordoba from the United States, the first three returning home at the expiration of three years, when the Uranometry was already finished as to its general details. Mr. Thome subsequently reviewed the entire work twice, and with the result that Dr. Gould considers it improbable that any star so bright as 7·0, on a scale which it has been desired to extend accurately from Argelander's, will have escaped insertion, while notwithstanding the great degree of nicety implied, he thinks the magnitudes are essentially correct to the nearest tenth. During the first two years the work was continued on all cloudless nights, both summer and winter, at an average of six hours' work each night. The total number of stars of which the magnitudes have been assigned is 10,649, and the total estimates of magnitudes 44,510, or more than four for each star.

With the view to having a uniform basis for estimates of magnitude throughout the whole heavens, Argelander's magnitudes for a region lying from 5° to 15° north of the equator, having the same meridian altitude at Bonn and Cordoba, were collected by classes, and "the stars of each class then assorted and shaded into the adjoining ones until a scale of tenths was formed." . . . "The scale as finally adopted resulted from the accordant estimates of all four assistants for each tenth up to 7·0." A "Type-belt Catalogue" of 722 stars was formed in this way, intended, as we have intimated, to serve as a standard for all future determinations of magnitude, in whatever part of the heavens. All the stars occurring in the "Uranometria" have been observed for accurate position at least four times with the meridian circle, and a general catalogue will appear in due course.

The charts are thirteen in number, and an index-chart is added showing at once the whole extent of the Uranometry. The printing was effected by the photolithographic process, as the most accurate and least expensive. Photographic negatives of the manuscript charts were taken, thus permitting their exact transfer to the stones. The chief trouble experienced in the printing was to give the star-dots the proper blackness, and yet to keep the milky-way within reasonable shade.

In a special chapter, Dr. Gould collects all variable and suspected variable stars, with particulars, thus providing interesting work for those amateurs who can command the southern heavens, and work from which much may be learned.

From a discussion of the general distribution of the stars throughout the sky, Dr. Gould is led to conclude that "there is in the sky a girdle of bright stars, the medial line of which differs but little from a circle inclined to the Galactic circle by a little less than 20°. The grouping of the fixed stars brighter than 4·1 is more symmetric relatively to that medial line than to the Galactic circle, and the abundance of bright stars in any region of the sky is greater as its distance therefrom is less. The known tendency to aggregation of faint stars towards the milky-way is according to a ratio which increases rapidly as their magnitudes decrease, and the law of which is such that the corresponding aggregation would be scarcely, if at all, perceptible for the bright stars." These facts, Dr. Gould continues, indicate the existence of a small cluster, within which our own system is excentrically situated, but which is itself not far removed from the mean plane of the Galaxy; this cluster he considers to be of a flattened shape, somewhat bifid, and consisting of rather more than 400 stars, of an average magnitude of 3·6 or 3·7, but comprising stars from the first to the seventh.

We have abridged these particulars from an interesting article on the "Uranometria Argentina," in the Buenos Ayres *Standard*.

It is impossible to avoid expressing admiration for the scientific spirit and enlightenment of the Government of the Argentine Republic in providing means for the execution of this important work, the first astronomical contribution from their National Observatory, but, we believe, to be followed by others, for which materials are completing, and which, it cannot be doubted, under the superintendence of Dr. Gould, will collectively secure for the Observatory of Cordoba a high position in the history of astronomical establishments, and, in connection with other enterprises of which we hear from time to time, for the comparatively small nation by which it is supported, the respect and good wishes of the scientific world.

THE "LICK OBSERVATORY," CALIFORNIA. From San Francisco we receive details of recent progress towards carrying out the intentions of the will of the late James Lick, who died October 1, 1877, bequeathing the sum of 700,000 dollars to trustees for the purpose of purchasing land and erecting upon it "a powerful telescope, superior to and more powerful than any telescope ever yet made," with an observatory and other appurtenances, to be conveyed eventually to "the Regents of the University of California." The first site considered was at Lake Tahoe, but it was soon rejected; Mount St. Helena, at the intersection of Napa, Sanoma, and Lake counties, was then visited; it is upwards of 4,300 feet high, and was known to have atmospherical conditions favourable for astronomical purposes. Mr. Lick spent one night upon its summit. Among other points visited was Mount Hamilton, the elevation of which is still greater, and Mr. Lick finding that its advantages, so far as known, were equal to those of the former mountain, finally determined upon Mount Hamilton as the site of his proposed observatory; it is something less than fourteen miles east by south, from San José in Santa Clara county. A road to the summit twenty miles long was commenced in 1875, and finished in December, 1876, at the expense of Mr. Lick, and surroundings to the extent of more than 1,500 acres were secured to form the observatory property. The site was thus, contrary to what has been generally stated, decided upon before Mr. Lick's decease, and Prof. Newcomb had been asked to test the capabilities of the station, to obtain a guide as to the size and character of the instrument or instruments to be provided; Prof. Newcomb was too much engaged upon his official duties to undertake this work in 1877, and recommended application to be made to Mr. S. W. Burnham, of Chicago, who arranged last April to visit Mount Hamilton, with his own 6-inch Alvan Clark refractor; he arrived in the middle of August, and after spending thirty-two nights upon the mountain, up to September 27, all of which except five were extremely favourable, he appears to have agreed in opinion with Prof. Newcomb, who was able to visit Mount Hamilton early in October, that it is "the finest observing location in the United States." With regard to the size of the great telescope to be